

523,388

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
4 March 2004 (04.03.2004)

PCT

(10) International Publication Number
WO 2004/019323 A2

(51) International Patent Classification⁷: **G11B 7/00**

(21) International Application Number:
PCT/IB2003/003252

(22) International Filing Date: 16 July 2003 (16.07.2003)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
02078217.3 5 August 2002 (05.08.2002) EP

(71) Applicant (for all designated States except US): **KONINKLIJKE PHILIPS ELECTRONICS N.V.** [NL/NL];
Groenewoudseweg 1, NL-5621 BA Eindhoven (NL).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **HENDRIKS, Bernardus, H., W.** [NL/NL]; c/o Prof. Holstlaan 6,

NL-5656 AA Eindhoven (NL). **BLOEMEN, Pascal, J., H.** [NL/NL]; c/o Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL).

(74) Agent: **VISSER, Derk**; Philips Intellectual Property & Standards, Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL).

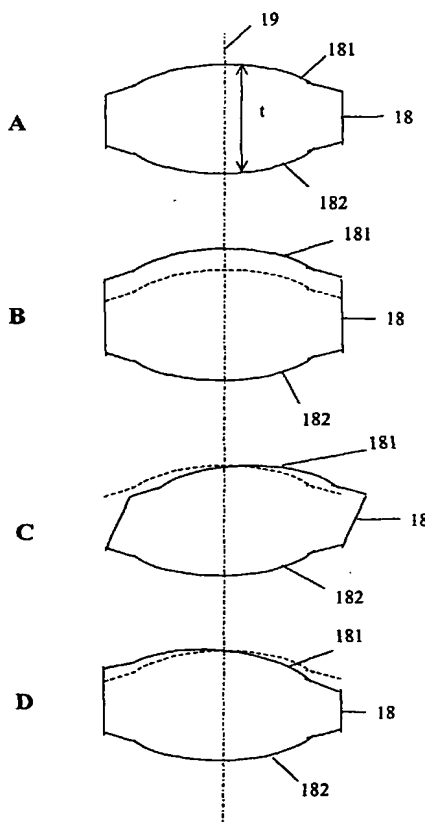
(81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO,

[Continued on next page]

(54) Title: SCANNING DEVICE INCLUDING AN OBJECTIVE SYSTEM FORMED OF A SINGLE MATERIAL

$$0.8 < \frac{t}{1.18 - 2.28 \left[FWD + \frac{t_d}{n_d} \right]} < 1.2 \quad (I)$$



(57) Abstract: An optical scanning device (1) for scanning an information layer (4) of an optical record carrier (2), the device (1) comprising a radiation source (11) for generating a radiation beam (12, 15, 20) and an objective system (18) for converging the radiation beam on the information layer, the information layer being covered by a transparent layer (3) of thickness t_d and refractive index n_d . The objective system comprises a lens formed of a single material. The lens satisfies the condition: Formula (I), where t is the thickness of the lens, FWD is the free working distance between the lens (18) and the carrier (2), where t , t_d and FWD are expressed in millimetres, and where $FWD + t_d/n_d < 0.51$.

WO 2004/019323 A2